Laboratory Equipment Manufacturer
www.mrclab.com

Operation Manual for Automatic Refractometers

REF-A61/62

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

3, Hagavish st. Israel 58817 Tel: 972 3 5595252, Fax: 972 3 5594529 mrc@mrclab.com

MRC.VER.01-9.12

Contents

I. APPLICATIONS ..... - 0 -

II. SPECIFICATIONS ..... - 2 -

III. WORKING PRINCIPLES ..... - 3 -

IV. OPERATION ..... - 4 -

V. MAINTENANCE ..... - 21 -

VI. SUPPLEMENTS ..... - 22 -

VII. CAUTIONS ..... - 22 -

Warning: The instrument can not provide the designed protection for operators who do not follow the right procedures and requirements given by the manufacturer.

Warning: All solutions must be handled with care according to the lab's safety regulation. Please make a reference to the related material safety data sheet. Wear the lab-gown, goggle and rubber gloves all the time. Be care of hot reagents.

Warning: Be aware of the risk of electric shock. Only the trained professionals are permitted to open the face panel or back cover.

I. Applications

REF-A61/A62 Automatic Abbe Refractometer is an instrument that can measure the refractive index (nD) of the transparent or translucent liquids and the mass fraction (Brix) of the sucrose solution. It offers user-friendly operation, friendly full color interface, accurate thermostatic control and mass data storage as well as quick, stable and accurate automatic measurement.

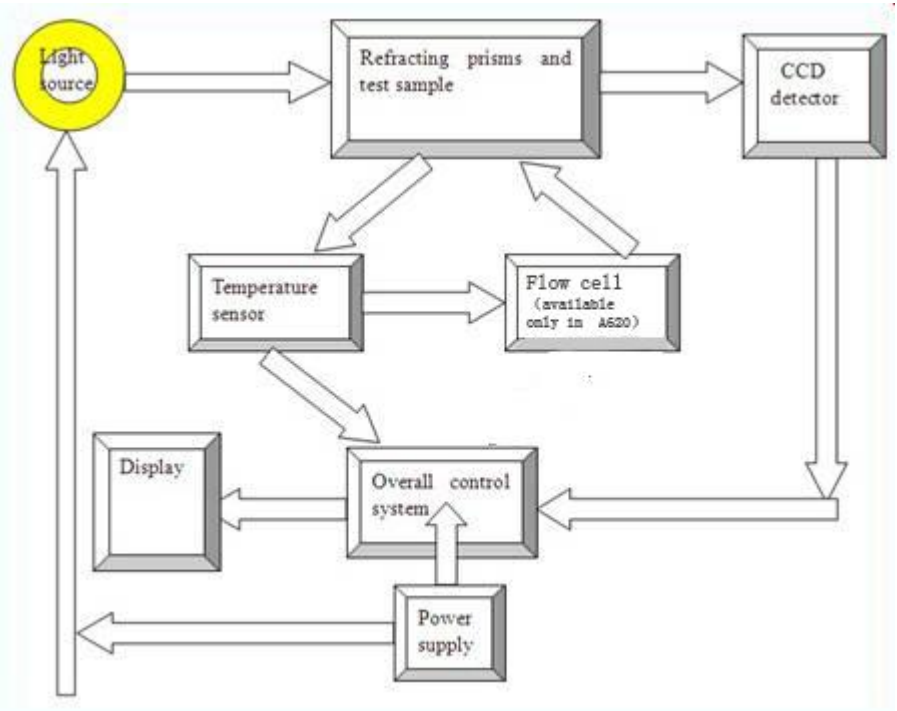
The refractive index is an important optical constant, and helps to know the optical property and purity of the substance. As it can measure the mass fraction (Brix) (0~95%, or refractive index 1.333-1.531), this instrument finds wide applications in petroleum, oil, medicine, paint, food, daily chemical and sugar industries etc.

II. Specifications

Refractive index range (nD):	1.3000-1.7000
Measured value error: (nD):	±0.0002
Measurement resolution (nD):	0.0001
Range of sucrose solution mass fraction (Brix):	0-95%
Measured value error (Brix):	±0.1%
Measurement resolution (Brix):	0.1%
Temperature display range:	0-50℃
Temperature control accuracy:	0.1℃
Temperature resolution:	0.1℃
Temperature control;	Built-in flow cell（available only in REF-A62）
Instrument dimension:	455mm*321mm*200mm
Power supply:	220±10%V, 50Hz
Rated power:	60W
Output interface:	RS232/USB/SD card/ U disk
Instrument weight (Kg):	10

III. Working Principles

1. Principle Framework



2. Principles

The principle of REF-A61/A62 Automatic Abbe Refractometer's measuring the refractive index of the transparent or translucent liquids is based on the zero angle measurement. Firstly linear array CCD detects the imaging image and sends it to the microcomputer system for data process; then the boundary, in which the zero angle lies, between light and shade is drawn; finally the refractive index or degree brix of test sample is displayed in digits.

IV. Operation

1. Instrument View

Front view

1. Lid 2. Sample slot 3. Touch Screen 4. Power switch
5. USB interface 6. SD card interface

Back view

1.Fan 2. USB interface 3.Power socket 4.PC serial port
5. Bath Interface（available only in REF-A62）

2. Instrument Interface

Make sure the prism surface is clean before start the instrument. If there is residue on the surface, do wipe it, or the instrument correctness will be affected. After you close the lid and connect the power supply, the instrument starts. The standby interface appears, as shown in Fig.1:

Fig.1

After click on any location or wait for a few seconds, the following interface appears, as shown in Fig.2:

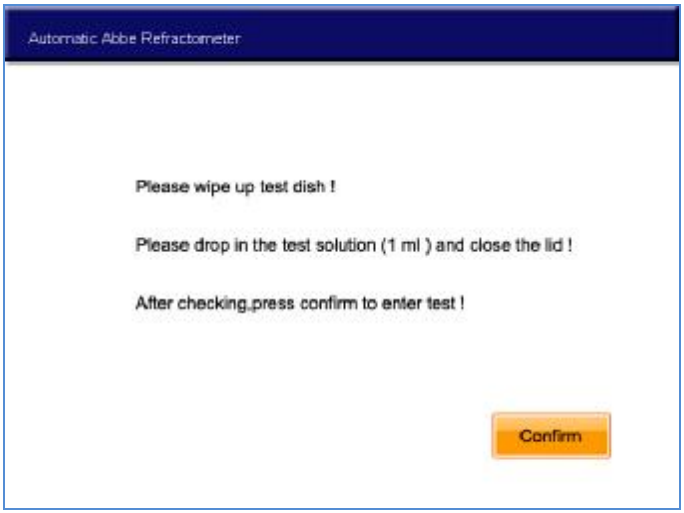

Automatic Abbe Refractometer
Please wipe up test dish !
Please drop in the test solution (1 ml) and close the lid !
After checking,press confirm to enter test !
Confirm

Fig.2

Perform step check according to the requirements in Fig.2. After verifying, press **Confirm** to enter the main operation interface, as shown in Fig.3:

Fig.3

Instruction to the functions in Fig.3:

Measure: measures, displays and records data for one time at each press

Measurement Times: increases the measurement times by one at each **Measure** press

Sample No.: displays the reference of test sample.

Current Temperature: displays the current prism temperature.

: Sets the instrument according to different test requirements.

: Provides current/history data.

: Provides help when problems occur.

: Please refer to user manual.

3. Instrument System Setting

After you press **System Setting**, the following interface appears, as shown in Fig.4:

Fig.4

Instruction to the functions in Fig.4:

Measurement Times : Sets and edits the sample measurement times

Sample No. : Edits the sample No. .

Measurement Type : Provides measurement type (nD/Brix)

Time Setting : Sets the instrument time.

: Sets the data output type

: User calibration and factory calibration

: Returns to the main interface

Press **Measurement Times** to enter the following interface, as shown in Fig.4-1:

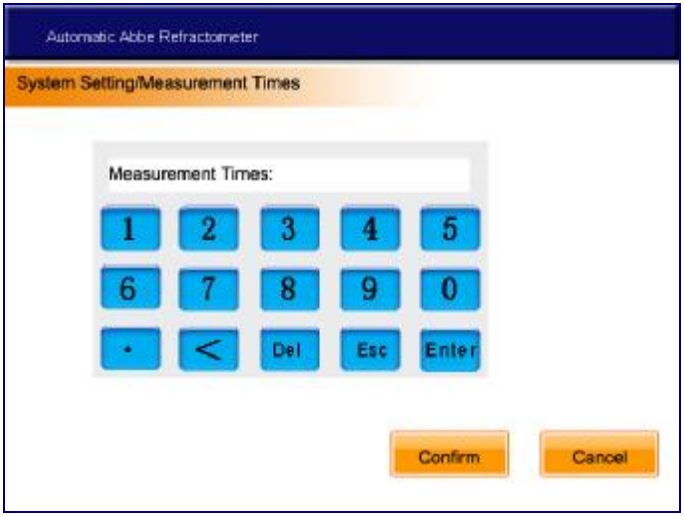


Fig.4-1

The measurement times is displayed in this interface, and you can enter digits from 0 to 9 to change the times. After changing the times, press **Confirm** to complete the change. (After input, you can see the changed digit is displayed in the interface according to your demand.)

Press **Sample No.** to enter the following interface, as shown in Fig.4-2:

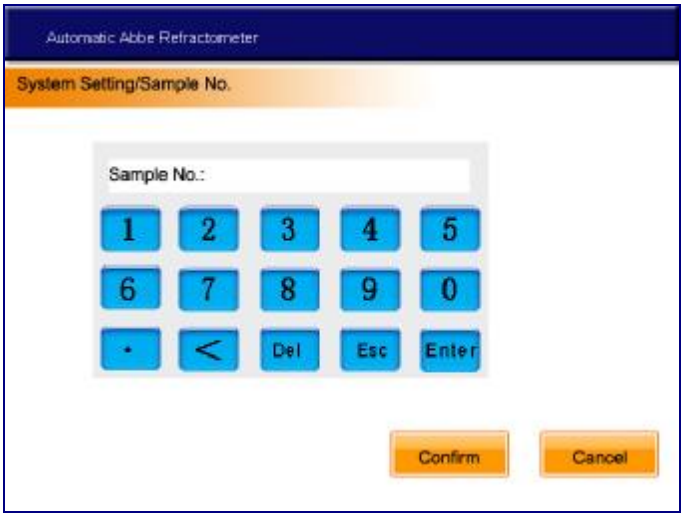


Fig.4-2

You can set the sample No. in this interface, and number the samples according to your demand, which makes it convenient for you to find the data. (After input, click **Confirm** to see the sample No. according to your demand.) Press **Measurement Type** to enter the following interface, as shown in Fig.4-3:

Fig.4-3

This interface offers the selection of measurement type:
nD (refractive index of testing sample)
Brix (brix of testing sucrose solution)
You can choose the suitable type by clicking the corresponding button.
Press **Time Setting** to enter the following interface, as shown in Fig.4-4:

Fig.4-4

This interface offers display time setting too. Edit the time according to your demand. After editing, press **Confirm** to complete time setting.

Edit process: after entering this interface, select the white digit with blue background to edit the year (note: the digit of year shall be among 1990 and 2100), then year editing is completed; press **Enter** to perform month editing, similarly, select the white digit with blue background to edit the month (note: the digit of month shall be among 1 and 12), then month editing is completed; press **Enter** to perform day editing, similarly, select the white digit with blue background to edit the day (note: the digit of day shall be among 0 and 31), then day editing is completed. The rest can be done in the same manner. After second editing is completed, press **Confirm** to complete time setting.

Press **Communication Type** to enter the following interface, as shown in Fig.4-5:

Fig.4-5

This interface offers selection of data output types:
RS232/USB
You can choose suitable data output type. Click corresponding button to complete the confirmation of output type.
Edit process: after entering this interface, the current communication type is selected. After you click and edit the communication type, the setting is completed. Meanwhile, the chosen communication type is displayed.
Press **Calibration** to enter the following interface, as shown in Fig.4-6:

Fig.4-6

Press **User Calibration** and enter the following interface, as shown in Fig.4-7:

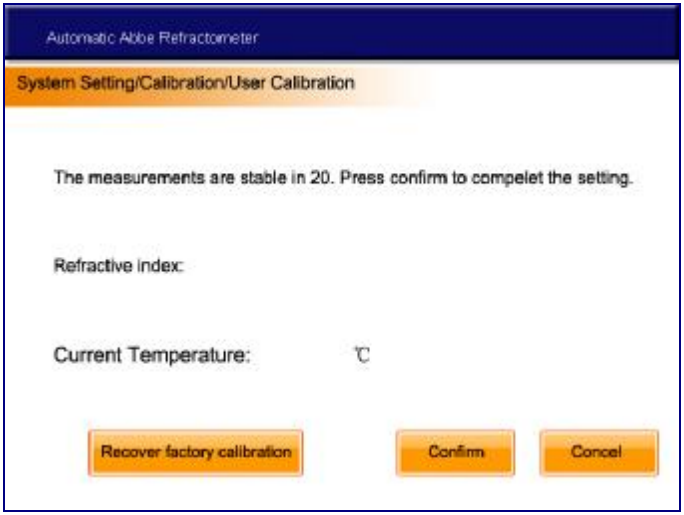


Fig.4-7

Calibration process: when the temperature is stable and around setting value as well as the measured refractive index is stable, press **Confirm** to complete calibration.

Note: if error occurs in the calibration or the instrument calibration fails, press **Factory Calibration** and then **Confirm** to reset to the factory data. If you need to calibrate again, just follow the calibration process.

4. Data List

After you press **Data List** in the main interface, the following operation interface appears, as shown in Fig.5:

Fig.5

Instruction to the keys in Fig.6:

Current Data : records and displays the current measured sample data.

History Data : records and displays the previous measured sample data.

Press **Current Data** to enter the following interface, as shown in Fig.5-1:

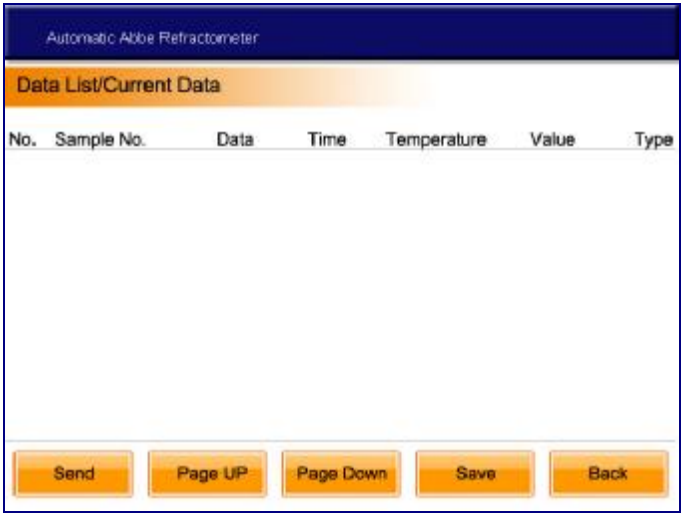


Fig.5-1

Instruction to the keys in the Fig.5-1:

Send :Sends the data to the upper computer software in the communication type selected by the user.

Page Up : Pages up the data.

Page Down : Pages down the data.

Save : Saves the current data to the history data.

Back : Returns to the previous interface.

Note: the maximum data storage is forty items in the current data interface.

Press **History Data** to enter the following interface, as shown in Fig.5-2:

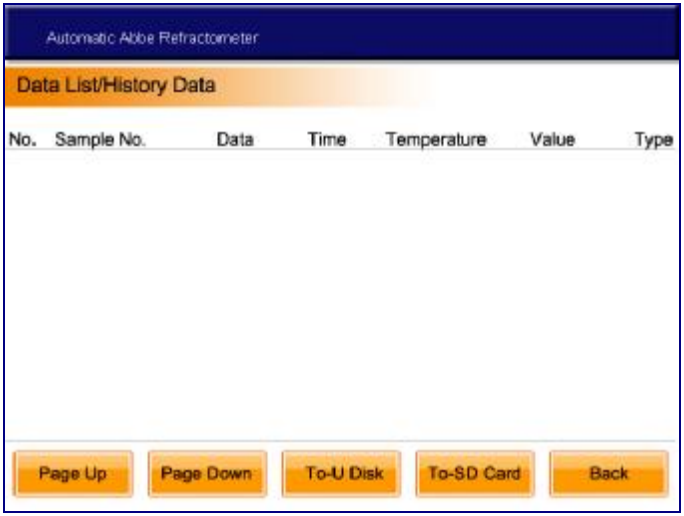


Fig.5-2

Keys:

Page Up: Pages up the history data

Page Down: Pages down the history data

T0-U Disk: Sends the history data to U disk

T0-SD Card: Sends the history data to SD card

Back: Returns to the previous interface

(Note: 1. the maximum data storage is 1000 data in the history data interface; the part excess 1000 shall be overlapped;

2. As to save the data in the U disk, make sure the U disk is plugged well and there is blank DATA.TXT document in disk root directory.
3. As to save the data in the SD card, make sure the SD card is plugged and there is blank DATA.TXT document in SD root directory.)

5. Help

After you press **Help** in the main interface, the following operation interface appears, as shown in Fig.6:

Automatic Abbe Refractometer
Help
1.Start the test after instrument dose have been on for more than five minutes
2.Sweep up the dish before liquid test.
3.In the tast,press confirm after the test value is stable value to make sure the test accuracy.
Refer to instruction manual to more information
Back

Fig.6

Key:

Back : returns to the previous interface.

6. About

After you press **About** in the main interface, the following operation interface appears, as shown in Fig.7:

Fig.7

Key:

Back : Returns to the previous interface.

7.Upper Computer Communication

The communication software interface of the upper computer is shown in Fig.8:

Fig.8

Instructions to keys in Fig.8

Connect: is clicked after COM, USB communication connecting method is confirmed

Save Data:

Delete Selected Data:

Print Data:

Clear All Data:

You can save, print or delete the test data transmitted from the instrument.

V. Maintenance

As this instrument is precision measuring instrument, you should maintain it as per the following steps to guarantee its accuracy and to prevent impairment in use:

A. Put the instrument in the dry and ventilated indoor when it is not used. The difference in indoor temperature should not be great, so as to prevent the instrument from mildew after damped.
B. Before and after using the instrument and when changing sample, you must firstly clean the working surface of the refractometer sample dish.
C. Clean the instrument after testing corrosive liquids.
D. It is forbidden to measure the strongly corrosion liquid.
E. The instrument should be kept clean and it is forbidden to touch the prism surface with bare hand. If there is dust on the prism surface, sweep the surface with high quality suede or long fiber absorbent cotton. If there is oil dirt on the surface, promptly clean it with mixed solution of alcohol and ether.
F. The shell plastic should be prevented from corrosive liquids to avoid instrument deformation.
G. It is strictly forbidden to assemble the instrument without producer’s permission. Send it for repair when failure occurs.

VI. Supplements

The whole warranty lasts for one year from the date of product sale (starting from the date on invoice), but the following cases are not in warranty:

1. The date over warranty period;
2. The damage caused by misuse;
3. The damage caused by dismantlement without manufacture's permission;
4. The damage caused by improper transportation and storage.

VII. Cautions

According to the characteristics of automatic Abbe refractometer, such as its high cleanness demands on sample slot and prism surface, and temperature has great influence on the liquid refractive index, the following advice are given for you to get more accurate data:

(1) Do check whether the sample slot is clean before each test to ensure there is no other residue.

(2) Reduce the difference between the ambient and setting temperatures as much as possible in setting temperature to accelerate the speed and stability of temperature control.

(3) When testing, leave the liquor in the sample slot for a certain time, and start measurement after the liquor temperature reaches the setting temperature value.